Research Note

NORTHERN ROCKY MOUNTAIN
FOREST AND RANGE EXPERIMENT STATION

Missoula, Montana

No. 96 April 1951

SUITABILITY OF WESTERN LARCH FOR VENEER AND PLYWOOD PRODUCTION

Lincoln A. Mueller
Forest Utilization Service

A continued expansion of the veneer and plywood industry in the Northwest has made it increasingly difficult for the industry to fill its log requirements. This supply situation has greatly stimulated interest in species which, up to the present, have seen little use for veneer. Any species the industry turns to must pass two critical tests. First, there must be an adequate supply of logs of suitable size and quality. Second, the wood must have desirable veneer and plywood producing properties. Western larch certainly meets the first of these requirements. Throughout most of its range in the Northern Rocky Mountain region, saw-timber trees of this species are characteristically clear boled.

Investigations at the Forest Products Laboratory in recent years, and other tests made by commercial veneer and plywood firms, have helped answer a number of specific questions regarding the second factor, the veneer and plywood producing properties of western larch. Number 1 of these questions is: Must the wood be heated prior to cutting and to what extent? This question is highly important because heating usually requires considerable additional investment in facilities. Other questions involve such matters as: How does veneer thickness affect the quality of the cutting? How do rotary and slicing methods compare? What drying schedules should be used for the various veneers? What are the gluing properties of larch? How best may larch plywood be finished? Not all of these questions were fully answered, but a range in experimental tests gave a good indication of the utility of larch for veneer and plywood. It is the purpose of this paper to summarize the results of these investigations so that they will be more readily available.

TEST PROCEDURE

Considerable care was taken to see that the sample logs selected for the various tests were representative of the species. Logs used were from 22 to 30 inches in diameter. They were taken from western Montana stands in the upper Blackfoot, Lolo Creek and Swan River valleys, and the vicinity of Warland. The trees from which they were cut ranged from 300 to 500 years in age, a common age for virgin western larch.

The logs and flitches were heated by both steam and hot water. The temperatures ranged from about 70° F. to 210° F. Veneer thicknesses

were likewise varied to determine the effect of this factor on the quality of the cutting. Both rotary and sliced veneer methods were studied. Green veneer yields were measured in several tests.

An important part of all the tests related to drying problems. Practically all of the drying was done in conventional roller-conveyor type driers equipped with temperature and speed controls. A number of drying schedules were used in order to determine the range of temperatures and drying times which are feasible. Following drying, samples of the veneer were fabricated into plywood by both hot and cold press processes. A number of different types of adhesives were used in order to provide additional information on the gluing properties of the species. A few exploratory tests were also included to study the finishing properties of larch plywood. These were confined largely to natural finishes.

Results

The results showed that western larch has good veneer and plywood producing properties.

No hard and fast conclusions could be reached regarding the need of heating. Rotary cut veneer meeting all the requirements of commercial production was produced with and without heat. On the average, veneer cut from stock that was heated showed fewer and less severe knife checks while that produced without heat, or at the lower temperature, cut to a smoother surface. Temperatures ranging from 140° F. to 160° F. appeared to offer the best compromise between these two conditions. Heating also softens the knots and thus reduces damage to the knife.

Larch appeared to be equally well adapted to slicing and rotary cutting. High quality veneers, 1/12 to 1/48 of an inch in thickness, were produced by slicing. The flitches, or cants, in the best were steamed for 12 hours before slicing.

The tests showed that larch veneer dried flat and to a reasonable uniform moisture content. The drying time, of course, varied with the veneer thickness and with the moisture in the green wood which was found to range as high as 150 percent in some of the sapwood. The moisture content of the heartwood was lower and less variable, averaging close to 50 percent. The effect of these variables on the rate of drying is shown by the Forest Products Laboratory tests made on veneer having an original average moisture content ranging from 43 percent to 69 percent (heartwood). One-sixteenth-inch veneer from this lot was dried to between 2 and 5 percent in 20 to 22 minutes in a roller-conveyor drier operating at 250° F. At the same temperature, it took 30 minutes to dry the 1/8-inch stock to this same moisture level. When the temperature was increased to 325° F. the 1/16-inch veneer dried to this moisture in only 11 to 18 minutes, but 18 to 22 minutes were required for the 1/8-inch stock. Some of the sheets showed a tendency toward brittleness when dried to this extent, and a slightly higher final moisture content appeared desirable.

Larch veneer compares favorably to Douglas-fir in respect to tangential shrinkage. A measurement of this property made by the Forest Products Laboratory in 1948 showed larch veneer to have an average tangential shrinkage of 6.05 percent.

Yields of both face and core stock appeared to be in good balance and well within the range normally sought by the industry.

Plywood tests showed that western larch can be satisfactorily glued under a relatively wide range of conditions. Good boards were obtained with all adhesives studied which included urea-, resorcinol-, and phenolic-resin glues, the latter in both liquid and film forms.

Tests on a limited lumber of panels indicated that western larch plywood has good finishing properties. The grain has little or no tendency to show through paint. The marked color contrast between the sapwood and heartwood is very attractive wher given a natural finish, and in many respects resembles yellow birch. The grain of quartered or vertically cut larch veneer is excellently suited for the production of matched grain patterns. This type of cutting also offers a means of capitalizing on the color variations found in the occasional band of internal sapwood that is characteristic of the species.